

CH. 4.5 SOLVE SYSTEMS OF LINEAR EQUATIONS USING ROW REDUCTION p. 251

1. MAKE SURE THAT ALL
EQUATIONS ARE WRITTEN
IN STANDARD FORM

$$AX + BY + CZ = D$$

2. WRITE ONE MATRIX
FOR BOTH SIDES OF EQUATIONS
RIGHT AND LEFT

3. ACTIVATE ROW REDUCTION
FUNCTION VER

$$\begin{cases} 2x + 3y - z = -2 \\ x + 2y + 2z = 8 \\ 5x + 9y + 5z = 22 \end{cases}$$

dim 3×4

$$\begin{bmatrix} 2 & 3 & -1 & -2 \\ 1 & 2 & 2 & 8 \\ 5 & 9 & 5 & 22 \end{bmatrix}$$

rref(A)

$\text{rref}([A])$

$$\begin{array}{ccc|c} 1 & 0 & 0 & x \\ 0 & 1 & 0 & y \\ 0 & 0 & 1 & z \end{array}$$

THIS METHOD ALLOWS NOT ONLY
TO DETERMINE THE COORDINATES
OF THE POINT OF INTERSECTION,
BUT ALSO IT ALLOWS TO TELL
IF WE HAVE INFINITE NUMBER
OF SOLUTIONS, OR IF THERE IS NO
SOLUTION

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$$\begin{bmatrix} 4 & -7 & 5 & -52 \\ 0 & 3 & 8 & 7 \\ 0 & 0 & -1 & 1 \end{bmatrix}$$

$\dim(3 \times 4)$

$$\begin{bmatrix} 1 & 0 & 0 & X \\ 0 & 1 & 0 & Y \\ 0 & 0 & 1 & Z \end{bmatrix}$$

INDEPENDENT

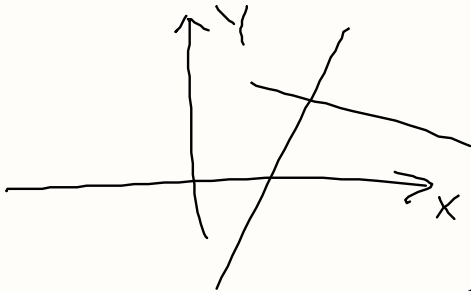
$$\begin{bmatrix} 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

INCONSISTENT

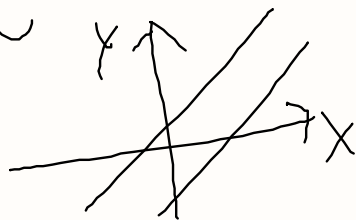
$$\begin{bmatrix} 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

DEPENDENT

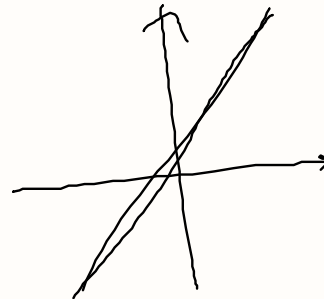
INDEPENDENT
LINES INTERSECT
ONE SOLUTION



SYSTEM IS INCONSISTENT
LINES ARE PARALLEL
NO SOLUTION



CONSISTENT
DEPENDENT
INFINITE
NUMBER OF
SOLUTIONS
LINES OVERLAP



(31)

$$\begin{aligned}x + y &= 3 \\2x + 2y &= 6\end{aligned}$$

$$\begin{aligned}x + y &= 3 \\x + y &= 3\end{aligned}$$

$$y_1 = 3 - x$$

$$y_2 = 3 - x$$

